

Appl. No. : 10/631,117  
Filed : July 31, 2003

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently amended) An internal combustion engine comprising an engine body having an outer surface that defines an outer area next thereto, an output shaft extending through the engine body, an air intake system arranged to deliver air to a combustion chamber of the engine, the air intake system having an intake valve movable between a closed position at which the air is not allowed to move to the combustion chamber and an open position at which the air is allowed to move to the combustion chamber, an exhaust system arranged to route exhaust gases in the combustion chamber to an external location of the engine, the exhaust system having an exhaust valve movable between a closed position at which the exhaust gases are not allowed to move to the external location and an open position at which the exhaust gases are allowed to move to the external location, at least one camshaft actuating the intake valve or the exhaust valve, the camshaft extending through the engine body and toward the outer area beyond the outer surface, a drive mechanism arranged to drive the camshaft, at least a portion of the drive mechanism being disposed in the outer area, a hydraulically operated change mechanism arranged to change an angular position of the camshaft relative to the output shaft, and a control valve unit configured to control the change mechanism, the control valve unit comprising an actuator and a valve member, the valve member at least in part being disposed within the outer area.

2. (Original) The engine as set forth in Claim 1, wherein the drive mechanism comprises a flexible transmitter extends around the output shaft and the camshaft such that the output shaft drives the camshaft through the transmitter, the control valve unit is disposed next to the transmitter.

3. (Original) The engine as set forth in Claim 2, wherein the transmitter forms a loop, the control valve unit is disposed out of the loop.

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4. (Original) The engine as set forth in Claim 1 additionally comprising a fluid passage through which a hydraulic working fluid moves between the control valve unit and the change mechanism, the engine body having a member defining the outer surface, the member internally forms at least a portion of the fluid passage.

5. (Currently Amended) An internal combustion engine comprising an engine body having an outer surface that defines an outer area next thereto, an output shaft extending through the engine body, an air intake system arranged to deliver air to a combustion chamber of the engine, the air intake system having an intake valve movable between a closed position at which the air is not allowed to move to the combustion chamber and an open position at which the air is allowed to move to the combustion chamber, an exhaust system arranged to route exhaust gases in the combustion chamber to an external location of the engine, the exhaust system having an exhaust valve movable between a closed position at which the exhaust gases are not allowed to move to the external location and an open position at which the exhaust gases are allowed to move to the external location, at least one camshaft actuating the intake valve or the exhaust valve, the camshaft extending through the engine body and toward the outer area beyond the outer surface, a drive mechanism arranged to drive the camshaft, at least a portion of the drive mechanism being disposed in the outer area, a hydraulically operated change mechanism arranged to change an angular position of the camshaft relative to the output shaft, and a control valve unit configured to control the change mechanism, the control valve unit at least in part being disposed within the outer area The engine as set forth in Claim 1, wherein the intake system comprises an intake conduit through which the air flows, the intake conduit has a portion coupled with the engine body, at least a portion of the control valve unit extends out of the outer area, the portion of the control valve unit overlaps with the portion of the intake conduit in a view generally normal to the outer surface.

6. (Original) The engine as set forth in Claim 5, wherein the engine body having a member that defines the outer surface, the portion of the intake conduit is coupled with the member.

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7. (Original) The engine as set forth in Claim 6, wherein the engine body comprises a cylinder head member that forms a portion of the combustion chamber, the cylinder head member is the member that defines the outer surface.

8. (Original) The engine as set forth in Claim 1, wherein the control valve unit has a longitudinal axis that extends generally along the outer surface.

9. (Original) The engine as set forth in Claim 1, wherein the control valve unit is positioned generally at the same level as the drive mechanism from the outer surface.

10. (Original) The engine as set forth in Claim 9, wherein the drive mechanism comprises a flexible transmitter extends around the output shaft and the camshaft such that the output shaft drives the camshaft through the transmitter, the control valve unit is positioned generally at the same level as the transmitter.

11. (Original) The engine as set forth in Claim 1, wherein the output shaft and the camshaft extend generally vertically, the outer surface is a top surface that extends generally horizontally, the outer area is a top area that extends generally above the top surface.

12. (Currently Amended) An internal combustion engine comprising an engine body having an outer surface that defines an outer area next thereto, an output shaft extending through the engine body, an air intake system arranged to deliver air to a combustion chamber of the engine, the air intake system having an intake valve movable between a closed position at which the air is not allowed to move to the combustion chamber and an open position at which the air is allowed to move to the combustion chamber, an exhaust system arranged to route exhaust gases in the combustion chamber to an external location of the engine, the exhaust system having an exhaust valve movable between a closed position at which the exhaust gases are not allowed to move to the external location and an open position at which the exhaust gases are allowed to move to the external location, at least one camshaft actuating the intake valve or the exhaust valve, the camshaft extending through the engine body and toward the outer area beyond the outer surface, a drive mechanism arranged to drive the camshaft, at least a portion of the drive mechanism being disposed in the outer area, a hydraulically operated change mechanism arranged to change an angular position of the camshaft relative to the output shaft, and a control valve unit configured to control the change mechanism, the control valve unit at least in part

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being disposed within the outer area The engine as set forth in Claim 1, wherein the engine body is configured as a V-shape to have a pair of cylinder banks, each cylinder bank has the camshaft, the change mechanism and the control valve unit, the intake system comprises a pair of intake conduits through which the air flows, each intake conduit has a portion coupled with the engine body, at least a portion of each control valve unit extends out of the respective outer area, the respective portion of each control valve unit overlaps with the respective portion of each intake conduit in a view generally normal to the outer surfaces.

13. (Original) The engine as set forth in Claim 1, wherein the camshaft actuates the intake valve.

14. (Original) The engine as set forth in Claim 1, wherein the engine powers a marine propulsion device.

15. (Currently amended) An internal combustion engine for an outboard motor comprising an engine body having at least an outer surface that defines an outer area next to thereto, an output shaft extending generally vertically through the engine body, an air intake system arranged to deliver air to a combustion chamber of the engine, the air intake system having an intake valve movable between a closed position at which the air is not allowed to move to the combustion chamber and an open position at which the air is allowed to move to the combustion chamber, an exhaust system arranged to route exhaust gases in the combustion chamber to an external location of the engine, the exhaust system having an exhaust valve movable between a closed position at which the exhaust gases are not allowed to move to the external location and an open position at which the exhaust gases are allowed to move to the external location, at least one camshaft actuating the intake valve or the exhaust valve, the camshaft extending generally vertically through the engine body and toward the outer area beyond the outer surface, a drive mechanism arranged to drive the camshaft, at least a portion of the drive mechanism being disposed in the outer area, a hydraulically operated change mechanism arranged to change an angular position of the camshaft relative to the output shaft, and a control valve unit configured to control the change mechanism, the control valve unit at least in part being disposed within the outer area, wherein the outer surface is a top surface of the engine body, and the outer area is a top area that extends generally above the top surface.

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16. (Cancelled)

17. (Currently Amended) The engine as set forth in Claim 15 [[16]], wherein the intake system comprises an intake conduit through which the air flows, the intake conduit has a portion coupled with the engine body, at least a portion of the control valve unit extends out of the outer area, the portion of the control valve unit overlaps with the portion of the intake conduit in a top plan view generally normal to the top surface.

18. (Original) The engine as set forth in Claim 15, wherein the control valve unit comprises a spool valve that has a longitudinal axis that extends generally horizontally along the outer surface.

19. (New) An internal combustion engine comprising an engine body having an outer surface, an output shaft extending through the engine body, an air intake system arranged to deliver air to a combustion chamber of the engine, the air intake system having an intake valve movable between a closed position and an open position, an exhaust system arranged to route exhaust gases in the combustion chamber to an external location of the engine, the exhaust system having an exhaust valve movable between a closed position and an open position, at least one camshaft actuating the intake valve or the exhaust valve, the camshaft extending through the engine body and toward the outer area beyond the outer surface, a drive mechanism arranged to drive the camshaft, at least a portion of the drive mechanism being disposed in the outer area, a hydraulically operated change mechanism arranged to change an angular position of the camshaft relative to the output shaft, and a control valve unit configured to control the change mechanism, the control valve unit comprising an actuator and a valve member, the valve member being disposed along the outer surface.